

## Claims

We claim:

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A6
1. A method for registering an image with a 3D physical object, comprising:  
acquiring a 3D graphics model of the 3D physical object;  
identifying a plurality of 3D calibration points on a surface of the object and  
corresponding 3D model calibration points in the 3D graphics model;  
illuminating the object with a calibration image using a projector at a fixed  
location;  
aligning the calibration image with each of the 3D calibration points on the  
surface of the 3D physical object to identify corresponding 2D calibration pixels in  
the calibration image; and  
determining a transformation between the 2D calibration pixels and the  
corresponding 3D calibration points of the 3D model to register the projector with the  
3D physical object.
2. The method of claim 1 further comprising:  
rendering the 3D graphics model using the transformation to generate an  
image; and  
illuminating the 3D physical object with the image using the projector at the  
fixed location.
3. The method of claim 1 including at least six 3D calibration points.
4. The method of claim 1 wherein the transformation includes a projector  
transformation matrix and a viewer transformation matrix.

5. The method of claim 1 wherein the calibration image includes a cross-hair, and further comprising:

aligning the cross-hair with the 3D calibration points using an input device couple to the projector.

6. The method of claim 1 further comprising:

illuminating the object with a plurality of calibration images using a plurality of projectors at a plurality of corresponding fixed locations;

aligning each calibration image with each of the 3D calibration points on the surface of the 3D physical object to identify corresponding 2D pixels in each calibration image;

determining a transformation between the 2D calibration pixels of each image and the corresponding 3D model calibration points to register each projector with the 3D physical object.

7. The method of claim 6 further comprising:

rendering the 3D graphics model using each transformation to generate a plurality of images; and

illuminating the 3D physical object with the image in parallel using the plurality of projector at the plurality of fixed location.